

## Green Supply Chain Management Concepts and Natural Resource Based View

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**Abstract:** The global economic is seeing significant intense competition for environmentally friendly products. Greening the supply chain has become a potentially valuable strategy of securing competitive advantage with the aim to reduce cost and satisfy customer needs as well as to take responsibility for reducing the environmental risks. Green Supply Chain Management (GSCM) has emerged as the key approaches in the supply chain management with the environmentally conscious mindset and involves addressing the influence and relationships of supply chain management to the natural environment. The appropriate development of GSCM concepts and practices may indeed aid in lessening the environmental burden as it is perceived to be the innovative management approach which enables firms to minimize the adverse environmental impacts from the acquisition of raw material up to the final use and disposal of the product. The objective of this study is to analyze the GSCM concepts through the theory of Natural Resource Based View (NRBV) of firm. The study provides explanation on how the organization's resources and capabilities are developed through the implementation of GSC practices to achieve the environmental objectives. The aim of this study is to provide useful references for managers to embark on GSC practices implementation and the influence of the performance outcomes.

**Key words:** Green supply chain management, natural resource based view, green supply chain practices, green supply chain performance, competition

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### INTRODUCTION

Today, consumers are more environmentally conscious and are displaying heightened environmental awareness and demand for environmentally friendly products (Jain and Sharma, 2012, 2014). Such growing demand indicates an urgent need for organizations to change their strategies to incorporate the environmental concerns into their business (Hsu *et al.*, 2013). When environmental demand and pressure increase, the traditional products related development strategies are clearly not enough to satisfy the new global environmental requirements (Shi *et al.*, 1998; Christmann and Taylor, 2001; Stentoft and Luthje, 2012).

Therefore, Green Supply Chain Management (GSCM) adoption is significant as it is perceived to be the innovative management approach which enables firms to minimize the adverse environmental impacts from the acquisition of raw material up to the final use and disposal

of the product (Zhu and Sarkis, 2007; ElTayeb *et al.*, 2010; Zailani *et al.*, 2012). GSCM has emerged as the key approach in the supply chain management which is motivated by an environmentally conscious mindset and involves addressing the influence and relationships of supply chain management to the natural environment (Hervani *et al.*, 2005; Zhu *et al.*, 2008; Seman *et al.*, 2012; Sharma, 2013).

GSCM is a dynamic and flexible organizational strategy that stimulates internal capabilities and focuses on the organization's desire to respond to diverse environmental risks and social concerns (Polansky, 1995; Zhu and Sarkis, 2007; Shi *et al.*, 2012; Wong *et al.*, 2012). In particular, GSCM is related to the degree to which organizations adjust their organizational and environmental objectives into a proactive integration strategy to convert the potential threats of the natural environment into competitive opportunities (Shi *et al.*, 2012; Fraj *et al.*, 2013). As such the appropriate

development of GSCM concepts and practices may indeed aid in lessening the environmental burden and improve organizational performance and enhance its competitive advantages simultaneously (Testa and Iraldo, 2010; Perotti *et al.*, 2012; Martusa, 2013; Hsu *et al.*, 2013). However, the debate on the appropriate development of GSCM concepts and practices as organization's competitive strategy is still not yet completely understood. As mentioned by Faj, one of the main reasons is the lack of solid theoretical foundation to explain how organization's develop this strategy. Hence, the objective of the study is to conceptualise a structural model to explain the theoretical link between the GSC practices and the NRBV of firm. In addition, the study aims to identify how an organization's resources and capabilities are developed through the implementation of GSC practices to improve its performance. The next section reviews the literatures related to the concept of GSCM characteristics and categorize the role of GSC practices into internal and external practices which represent the NRBV constructs causally ambiguous and socially complex resources. The study then focuses on literatures on the theoretical link between the GSC practices and the NRBV of firm to Environmental Performance (ENP) and Economic Performance (ECP). Finally the GSCM-NRBV conceptual model framework is proposed based on the work done by Shi *et al.* (2012) and Zhu *et al.* (2012).

**Literature review:** The literature review provides a rationale for the emergence of the green concept in supply chain management. The review provides a brief synthesis of the literature pertaining to green supply chain management and using past research and anecdotal evidence to the multifaceted concepts of GSCM and NRBV.

**Supply chain management with green concept:** Supply Chain Management (SCM) can be defined as a vital business function to efficiently integrate suppliers, manufacturers, warehouses, transporters, retailers and customers to ensure that the right product or service is distributed at the right quantities at the right location and at the right time to minimize system wide cost and at the same time satisfy customer requirements (Mentzer *et al.*, 2001; Hervani *et al.*, 2005).

In the last two decades with organizations going global, SCM has appeared as important management concepts in business activities to help organizations to develop win-win strategies that achieve profit and market share. Thus, organizations increasingly find that they

must rely on effective supply chains or networks to compete in the global market. However, along with the increasingly pressure for the concern on environmental issues, the organizations are becoming interested in integrating the "green" concept into their SCM. Therefore, the green initiative has become a potentially valuable strategy of securing competitive advantage with the aim of reducing cost and satisfying customer needs as well as taking responsibility for reducing the environmental risks (Martusa, 2013).

**Green supply chain management:** GSCM was derived from the philosophy of greening the supply chain management as an important organizational strategy with the environment aimed at minimizing system wide cost and at the same time satisfying customer requirements. GSCM is perceived to enable lower environmental risk and impact to achieve competitive objectives and sustainable development (Darnall *et al.*, 2008; Testa and Iraldo, 2010; Shi *et al.*, 2012; Zhu *et al.*, 2012; Hsu *et al.*, 2013; Jain and Sharma, 2012, 2014) through recycling, reusing, reducing, reworking, refurbishing, reclaiming and remanufacturing in the supply chain process to improve the environmental performance of an organization (Green *et al.*, 2012; Lee *et al.*, 2012; Sarkis, 2012; Sharma, 2013).

The interest of academia in GSCM has only begun to increase substantially in the late 1990s focused on various variables as compared to the earlier researcher's main focus on the necessity and importance of GSCM which defined the meaning and scope of various terms (Srivastava, 2007). For example, Zhu *et al.* (2005, 2008) defined GSCM as an effective management tool and philosophy which ranged from internal environmental management, green purchasing, cooperation with customer, eco design and investment recovery with closing the loop with reverse logistic. Srivastava (2007) further defined GSCM as integrating environmental thinking in supply chain management which includes product design, material sourcing and selection, manufacturing processes, delivery of the final product to customers and end-of-life management of the product after its useful life. Li (2011) further explained GSCM as a process of using green resources or environmentally friendly material, green processes and green outputs which it's defined as the end of life of a product from reusable till disposable. Other studies defined and explained the meaning and scope of GSCM in different aspects which GSCM defined as an important approach to evaluate and measure an organization's performance when environmental issues have been addressed (Green *et al.*, 2012; Lee *et al.*, 2012; Shi *et al.*, 2012;

Table 1: Literature definitions of GSCM

GSCM definition	Authors
GSCM as a process of using green resources or environmentally friendly materials, green processes and green outputs which is defined as the end of life of a product from reusable till disposable	Zhu <i>et al.</i> (2005) and Li (2011)
GSCM as the integrating environmental thinking in supply chain management which includes product design, materials sourcing and selection, manufacturing processes, delivery of the final products to customers and end-of-life management of the product after its useful life	Hervani <i>et al.</i> (2005), Servastava (2007), Zhu <i>et al.</i> (2008), Seman <i>et al.</i> (2012), Li (2011), Shi <i>et al.</i> (2012), Sharma (2013)
GSCM as an effective management tool and philosophy which ranged from internal environmental management, green purchasing, cooperation with customer, eco design and investment recovery with closing the loop with reverse logistic to minimize adverse environmental impacts, reduce operational cost, satisfy customer needs and to take responsibility to support the protection of the environment	Zhu <i>et al.</i> (2005), Hervani <i>et al.</i> (2005), Testa and Iraldo (2010), Eltayeb <i>et al.</i> (2010), Lin <i>et al.</i> (2011) Zhu <i>et al.</i> (2012), Shi <i>et al.</i> (2012), Zailali <i>et al.</i> (2012), Seman <i>et al.</i> (2012) Sarkis (2012) Sharma (2013), Martusa (2013) and Hsu <i>et al.</i> (2013)
GSCM defined as an important approach to evaluate the strengths and weaknesses in the form of actions taken and relationships in response to concerns pertaining that related to the natural environment and organization performance	Zhu <i>et al.</i> (2008), Yang and Zhang (2012) and Lin <i>et al.</i> (2011)

Zhu *et al.*, 2012). In summary, GSCM is understood as the SCM which is motivated by an environmental conscious mindset and involves addressing the influence and relationships of SCM and taking responsibility to reduce the environmental risks (Hervani *et al.*, 2005; Zhu *et al.*, 2005; Vachon and Klassen, 2006; Srivastava, 2007; Darnall *et al.*, 2008; Zhu *et al.*, 2008; ElTayeb *et al.*, 2010; Testa and Iraldo, 2010; Lin *et al.*, 2011; Lee *et al.*, 2012; Sarkis, 2012; Seman *et al.*, 2012; Shi *et al.*, 2012; Zailani *et al.*, 2012; Zhu *et al.*, 2012; Hsu *et al.*, 2013; Martusa, 2013; Sharma, 2013; Laosirihongthong *et al.*, 2013). Table 1 below summarized the literature definitions of GSCM.

The goal of GSCM is to minimize adverse environmental impacts, reduce operational cost and satisfy customer needs as well to take responsibility to protect the environment (Seman *et al.*, 2012; Sarkis, 2012; Sharma, 2013). Hence, the appropriate implementation of the GSC practice is significant to achieve the GSCM goal to protect the environment.

**GSC practices:** The GSC practice is an environmental initiative that involves the reduction, reuse and recycling of materials in the process of which leads to lower environmental impact (Perotti *et al.*, 2012). Organizations that adopt GSC practices are perceived to actually incorporate the environmental concerns into SCM which display a heightened level of awareness for green practices and environmental issues and presume to focus on the utilization of energy and resources to make supply chains environmentally sound and sustainable (Luthra *et al.*, 2011). According to Zhu *et al.* (2012), GSC practices can be categorized into internal and external GSC practices and both practices enable the evaluation of an organization's awareness, strengths and weaknesses.

**Internal GSC practices:** The Internal GSC practices (IGSCP) defined by literatures are the Internal

Environmental Management (IEM) initiatives which do not directly involve suppliers or customers (Zhu *et al.*, 2012; Shi *et al.*, 2012). The IEM practices integrate the preventive environmental strategy in cross-functional cooperation for environmental improvement. The main concern of the IEM is to continue to improve the environmental management systems to reduce the amount of effluent by systematically designing the manufacturing process (Potoski and Prakash, 2005; Zhu *et al.*, 2005; Darnall *et al.*, 2008; Shi *et al.*, 2012; Zhu *et al.*, 2012). As such, it is imperative that the IEM practices have the commitment and support from the senior and mid-level managers (Zhu *et al.*, 2008a). Top management plays a key role in the IEM practices for resource allocation, support for long-term GSCM process, and most important support for the budget commitment. The IEM practices stress the need for continuous improvement in striving to protect the environment (Sroufe, 2003; Darnall *et al.*, 2008). According to Potoski and Prakash (2005), organizations that practice IEM system are required to constantly review their environmental issues and formulate action plan together with identifying the governance responsibility for continued improvement and to correct environmental problems. Hence, organizations that develop effective IEM practices are rooted in the realization and renewed mindset of creating quantifiable goals to reduce environmental impact which in turn can increase the organization's profit and competitiveness (Darnall *et al.*, 2008). Organizations that implement IEM practices may become certified to ISO14001 standard through the guidance of the International Organization for Standardization (ISO). ISO is a nongovernmental organization which serves as an external third-party to ensure the IEM standard is conformed to and that the ISO 14001 standards are met. An organization labeled with ISO 14001, indicates that the organization has engaged in a total quality environmental management system that documents the organization's pollution aspects and

identifies pollution prevention process improvement over time. Study by Darnall (2006) on environmental management system showed that organizations have potential to adopt more sophisticated environmental strategies leveraged from the basic pollution prevention principles to a higher level of environmental improvement as the organizations have built up the knowledge base and commitment to continual improvement. Hence, the IEM adopter is perceived to be more successful during the implement of GSCM as it possesses the internal tacit knowledge required to manage the environmental impacts of their supply chain (Darnall *et al.*, 2008; Heras *et al.*, 2011). As such the IEM practices are essential management resources that develop over time that yield the organization's unique capabilities (Darnall *et al.*, 2008; Shi *et al.*, 2012; Wong *et al.*, 2012). The following are the seven measurement items from Zhu *et al.* (2012) that can help to justify IEM compliance:

- Commitment of GSCM from senior managers
- Support for GSCM from mid-level managers
- Cross-functional cooperation for environmental improvements
- Total quality environmental management
- Environmental compliance and auditing programs
- ISO 14001 certification
- Environmental management system exist

**External GSC practices:** External GSC practices (EGSCP) are environmental initiatives including the transaction and cooperation activities with suppliers and customers which are perceived to demonstrate the reactive relationship with the supply chain partners (Zhu *et al.*, 2012). The study by Shi *et al.* (2012) defined the EGSCP as inter-organizational environmental practices that generate socially complex resources through environmental collaboration that in turn would involve trust, commitment and joint goal setting among the multiple supply chain members.

One of the most comprehensive frameworks classifying GSC practices has been proposed by Zhu and Sarki (2006) and Zhu *et al.* (2005). The EGSCP has been identified as the Green Purchase (GP), Eco-design (ECO), Cooperation with Customer Environmental Management (CC), Investment Recovery (IR) and Reverse Logistic (RL) which imply the key approaches of GSCM practices that examine the external linkages with their supply chain partners (Zhu *et al.*, 2012). These EGSCPs created a sound environmental management activity that focused on the difference phases of environmental initiatives that link the external cooperation with the suppliers and customers from upstream, midstream to downstream. Considering the

number of studies that have built on it as a reference framework, this study choose three EGSCPs-GP, ECO and RL to represent the three phases of GSC that undertake the upstream, midstream and downstream integration.

GP is the first phase of the EGSCP which focuses on the need for an organization to be in place before conducting the operations (Zhu *et al.*, 2012; Hsu *et al.*, 2013). GP ensures that purchased items possess desirable environmental attributes such as recyclable, reusable and contain nontoxic materials (Zhu *et al.*, 2008; Hsu *et al.*, 2013). It functions by addressing the use of substitute material through proper sourcing of environmental friendly material and minimizing the use of hazardous material. GP is a good cross-functional tool in terms of formalizing environmental collaboration, environmental monitoring, communications, knowledge sharing and the protocols for interactive information sharing among the various functions (Shi *et al.*, 2012). Explained by Vachon and Klassen (2006), the environmental collaboration in GP is the collaboration through planning, sharing and solving environmental issues with the suppliers. The main collaboration functions with suppliers sharing design specifications, sourcing environmental friendly purchase items and solving environmental problem with a joint system. This constitutes showing the commitment to ensure supplier compliance to environmental objectives. The following are the six measurement items from Hsu *et al.* (2013) that can help to justify the GP compliance, namely:

- Provides design specs to suppliers that include environmental requirements for purchased items
- Requires its suppliers to develop and maintain an environmental management system
- Requires its suppliers to have a certified EMS such as ISO 14001
- Makes sure that its purchased products must contain green attributes such as recycled/reusable items
- Make sure that its purchased products do not contain environmentally undesirable items such as lead or other hazardous or toxic materials
- Evaluates its suppliers based on specific environmental criteria

ECO is the second phase of EGSCP which aims to reduce the environmental impact of the products during their life cycle which an organization has to have in place during the GSCM operations (Zhu *et al.*, 2012; Hsu *et al.*, 2013). Products designed as environmentally friendly aim to be energy-efficient, hazard free with low energy consumption and high recyclability (Lin *et al.*, 2011; Zailani *et al.*, 2012; Hsu *et al.*, 2013; Conding *et al.*, 2013a, b). It is through the philosophy of designing physical

objects, building the environment mindset and services to comply with the principles of environmental sustainability (Zailani *et al.*, 2012; Hsu *et al.*, 2013). The ultimate aim for ECO is to reduce the organization's costs and environmental impact. The effort is through the continuous improvement in the green technical and operation initiatives to develop good working relationship with consumers, suppliers and governmental authorities for design of environmental products in order to be truly integral as GSC initiators. Seven measurement items from Hsu *et al.* (2013) can help to justify the ECO compliance:

- Produces products that have recycled in their contents such as recycled plastic and glass
- Use life cycle assessment to evaluate the environmental load of its products
- Makes sure that its products have recyclable or reusable contents
- Produces products that reduce the consumption of materials or energy during use
- Make sure that its packaging has recyclable contents
- Make sure that its packaging is reusable
- Minimizes the use of materials in its packaging

RL is the last phase of closing the loop in the EGSCP which enable an organization to focus on adding value as the post operational practices to minimize harm to the environment (Zhu *et al.*, 2008; Hsu *et al.*, 2013). The main task is to recover the discarded products or packaging for reuse and recycle. The manufacturing firms main schedule jobs would have to organize shipping to collect the defective product or recycle the packaging. The product would travel in reverse through the supply chain network in order to retain any use from the defective product. RL is perceived to have positive economic benefit from the action construct to reuse, remanufacture and recycling of the product and packaging material (Zhu *et al.*, 2008). The following are the six measurement items from Hsu *et al.* (2013) that can help to justify RL compliance:

- Collects used products from customers for recycling, reclamation, or reuse
- Collects used packaging from customers for reuse or recycling
- Requires suppliers to collect their packaging materials
- Returns products to suppliers for recycling, retaining of materials, or remanufacturing
- Returns its packaging to suppliers for reuse or recycling
- Returns the products from customers for safe refill

The above three phases of the EGSCPs are viewed as an important and appropriate measurement scale to

identify the fundamental activity of GSC initiatives (Darnall *et al.*, 2008; Zhu *et al.*, 2012; Hsu *et al.*, 2013) which possess unique resources that build through the interacting activities with the supply chain partners.

**GSC performance:** GSC performance is the performance measurement for organizations to assess their opportunities and benefits after involvement in the implementation of GSC practices as a management strategy. According to Sarkis (2012), GSC performance is the measurement result of the process of quantifying the environmental actions which measure the ability of organization to reduce the supply chain environmental risks and also include benefits from establishing systematic environmental plans. However, organizations are faced with a range of possible approaches for the development of the indicators to measure the organization performance and this study focused on Environmental Performance (ENP) and Economic Performance (ECP) to measure the organization's opportunities.

**Environmental performance:** ENP which measures the ability of organization to reduce air emission, effluent waste, and solid waste and the ability to decrease the consumption of hazardous and toxic material (Zhu *et al.*, 2008, 2012; Shi *et al.*, 2012; Laosirihongthong *et al.*, 2013). Thus, reduction in environmental impact may represent the effect of the GSC practices implementation that improves the organization's environmental situation. Below are six measurement items from Zhu *et al.* (2008) study to measure the organization's ability to reduce environmental impact:

- Reduction of air emissions
- Reduction of waste water
- Reduction of solid wastes
- Decrease of consumption for hazardous/harmful/toxic materials
- Decrease of frequency for environmental accidents
- Improvement of an enterprise's environmental situation

**Economic performance:** ECP relates to the ability to reduce costs associated with purchased material, reduced energy consumption, waste treatment, waste discharge and fines for environmental accidents (Zhu *et al.*, 2008; Heras *et al.*, 2011; Green *et al.*, 2012). The five measurement items from Lin *et al.*, (2011) and Zhu *et al.*, (2012) to measure the cost saving include:

- Decrease of cost for materials purchasing
- Decrease of cost for energy consumption

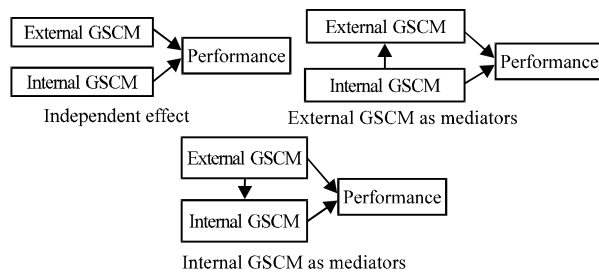


Fig. 1: Three possible models of GSCM practices on performance

- Decrease of fee for waste treatment
- Decrease of fee for waste discharge
- Decrease of fine for environmental accidents

**Link between GSC practices and GSC performance:** This study is based on the past work done by Zhu *et al.* (2012). The framework structure of the three possible models of GSCM practices on performance is showed in Fig. 1. Zhu *et al.* (2012) tested the mediating effect between the GSC practices and suggested that manufacturing need to coordinate the internal and external GSC practices in order to reap the environmental, operational and economic performance benefits. Another study by Green *et al.* (2012) showed the adoption of GSC practices significantly improved the organization's capabilities which lead to improve its environmental and economic performance. Fraj *et al.* (2013) studied green marketing on performance following the NRBV and results revealed that market oriented practices directly determine the environmental performance. Fraj *et al.* (2013) study also showed an indirect link of positive economic performance through environmental performance. Other literatures showed positive and potential cost saving when adopting the GSC practices (López-Gamero *et al.*, 2009; Green *et al.*, 2012; Shi *et al.*, 2012; Zhu *et al.*, 2012; Laosirihongthong *et al.*, 2013). The literatures have acknowledged the better implementation of GSC practices leverage the advantageous position in environmental performance and positively improve economic performance.

**The natural resource based view :** The NRBV was derived from the earlier theoretical contribution of Resource Based View (RBV) which focuses on the important of organizational resources that are valuable, rare, in-imitable and non-substitutable as a basic competitive advantage (Barney, 1991). However, NRBV stressed the importance of environmental factors that facilitate the development of the organization's unique capabilities (Hart, 1995; Zhu and Sarkis, 2007; Vachon and Klassen, 2006, 2008; Shi *et al.*, 2012). The theoretical underpin of NRBV is to

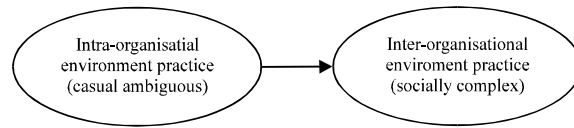


Fig. 2: Natural resource based and GSCM practice

develop the connection between the environmental challenge and organization resource which NRBV considers innovative environmental solution as key elements in the generation of organizational capabilities that eventually influence performance by generating differentiation and cost advantages (Barney, 1991; Hart, 1995; Fraj *et al.*, 2013).

Identified by Wernerfelt (1995), it is this bundle of valuable resources that enable organizations to sustain its competitive position in which this value creates strategic resources allowing it to outperform its competitors (Barney, 1991; Hart, 1995; Wernerfelt, 1995; Shi *et al.*, 2012; Wu and Lin, 2013, Wu *et al.*, 2013). Explained by Hart (1995), it is the in-imitable strategic resources that protect it from competition as these resources are not easy to duplicate or imitate by competitors who acquire similar resources. This is because such resources can be causally ambiguous as have developed over time through repeated learning and exploring. The causal ambiguous keeps competitors from understanding the relationship between resources and competitive advantage. Similarly, the resources can also build through the interacting activities with large numbers of people or teams to establish the socially complex networks to preempt the competition (Barney, 1991; Hart, 1995; Wernerfelt, 1995; Shi *et al.*, 2012; Wu and Lin, 2013). Hart (1995) suggested that organizations can establish causally ambiguous resources and socially complex practices to articulate the relationship among organization's environmental resources, capabilities and competitive advantages (Hart, 1995; Shi *et al.*, 2012). As stated in the research by Shi *et al.* (2012), taking the NRBV perspective, the intra and inter-organizational environmental practices were part of the organization's overall strategy which stressed the importance of an organization's internal resources and capabilities to yield sustainable competitive advantage. Organizations can achieve superior performance if the resources and the capabilities of the organization are exploited in an appropriate manner (Wong *et al.*, 2012). The framework by Shi *et al.* (2012) shown in Fig. 2 is used to explain the theoretical link between the internal and external GSC practices and NRBV of firm.

## MATERIALS AND METHODS

The theoretical link is depicted in Fig. 3 as being direct and positive as such hypotheses can be developed to test and validate the framework. A quantitative method

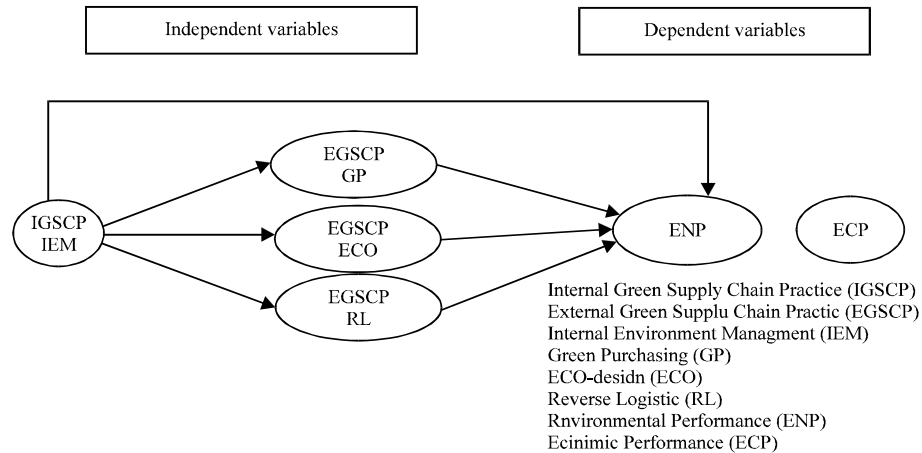


Fig. 3: Proposed conceptual framework

is proposed to empirically test the hypotheses and a questionnaire survey is suggested to use as the main data collection instrument because it enables examination and explanation of the relationships between constructs as well to correspond to the purpose and hypothesis of this study. The organizations certified with ISO 14001 are perceived to be more likely to adopt green supply chain initiatives (Darnall *et al.*, 2008; Zhu *et al.*, 2008; Hsu *et al.*, 2013). Thus, the sampling frame is proposed to focus on ISO14001 certified firms and target population is to focus on the management level in the supply chain, environmental and safety departments.

## RESULTS AND DISCUSSION

### Theoretical framework

**Theoretical link between GSC practices and NRBV:** The NRBV theory takes the perspective that resources lead to development of organizational capabilities which provide the key sources of sustainable and competitive advantage (Barney, 1991). Hence by appropriately exploiting the resources and capabilities organizations are able to stay ahead of present or potential competition (Barney, 1991; Hart, 1995; Porter, 1995; Shi *et al.*, 2012; Wong *et al.*, 2012). In the course of the implementation of IGSCP that take a proactive stance through learning and repeating practices, organizations are able to generate causally ambiguous resources that are valuable, rare, inimitable which effectively reduce the environmental impacts.

Organizations that adopt the causally ambiguous capabilities are perceived to promote for performance advantages in terms of cost efficiency, increased output, quality improvement and the satisfaction of uncertain customer demands (Shi *et al.*, 2012). Drawing from NRBV, the causally ambiguous capability is a skill-based

resource involving tacit skill development and experiential learning to develop complementary assets (Hart, 1995). As such, the IEM practices stand as the causally ambiguous resources that yield the development of the organization's unique capabilities which are perceived as the organization's competitive advantage.

According to the NRBV theoretical argument, organizations should adopt causally ambiguous strategies and implement socially complex practices to create the core competencies for the organization's sustainable development (Hart, 1995; Shi *et al.*, 2012). The EGSCP which include GP, ECO and RL represent the unique resources that build through the interacting activities with the supply chain partners. When organizations extend the socially complex resources through environmental collaboration with supply chain partners, this social network enables the organization to develop trust and commitment with partners and encourage knowledge exchange and reciprocity (Hart, 1995). Hence, the adoption and implementation of causally ambiguous and socially complex GSC practices leads to appropriate use of the organization's resource and organization's development capability (Das and Teng, 2000; Wong *et al.*, 2012; Fraj *et al.*, 2013). Organizations can achieve superior performance and sustain competitive advantage when an organization adopts the IEM within the organization and extend the GP, ECO and RL practices with their supply chain partners to generate environmental collaboration with the aim to reduce environmental risks.

**IGSCP and EGSCP:** From the NRBV perspective, the IGSCP and EGSCP are part of the organization's overall GSCM strategy which stressed the importance of an organization's internal resources and capabilities. Hence, both practices represent organizationally unique

resources and capabilities that are valuable, rare and not easy to duplicate which enable the determination of the competitive position with the environmental mindset and environmental management consideration (Hart, 1995; Shi *et al.*, 2012; Fraj *et al.*, 2013; Wu, 2013; Wu and Lin, 2013; Wu *et al.*, 2012). Thus, the IGSCP (IEM) and EGSCP (GP, ECO and RL) are the main GSC practices that need to be implemented as these practices possess the causally ambiguous and socially complex characteristic with unique capabilities to achieve promising performance benefits.

**IGSCP and ENP:** The IGSCP is the IEM which is one of the important proactive practices to improve the environmental management systems (Shi *et al.*, 2012; Zhu *et al.*, 2012; Laosirihongthong *et al.*, 2013). In particular, the IEM is the organized and systematical environmental management system that promotes extensive internal involvement and continuous learning to reduce environmental risks and prevent pollution. As such, the IEM implementation generates causally ambiguous resources that are valuable and not easy to duplicate. Thus, the continuous reduction in environmental impacts may represent an effective IEM implementation that improves the organization's environmental situation (Zhu *et al.*, 2008). Hence, the IEM adoption can lead to the improvement in ENP.

**EGSCP and ENP:** The EGSCP including the GP, ECO and RL are the valuable, rare and inimitable socially complex resources established through focus on collaboration based activities on developing environmental friendly products. Organizations equipped with such capabilities aid in the adoption of more advanced environmental technologies. This means that a GP with the ability to make sure the purchased products do not contain environmentally undesirable items can ensure that suppliers are in compliance with the environmental objectives. ECO preemption of the environmental impact at the product design stage can safeguard the environmental impact throughout the whole life cycle and RL recovering the discarded products or packaging for reuse and recycle aid in the reduction of environmental risks. Therefore, the implementation of EGSCP can lead to the improvement of ENP.

**ENP and ECP:** The cost saving nature of ENP should lead to ECP by the cost return of reduced material purchase, reduced energy consumption and reduced waste treatment and discharge cost. Organizations that practice IEM to reduce environmental risks and prevent pollution can improve in ENP. However, GP to reduce the

use of waste materials can lead to better cost saving, ECO pre-designed to use recycle materials can lead to reduce in material consumption and RL that adopts the reverse logistic to reuse of materials can lead to a positive impact on ECP improvement. This may explain why the ENP has a positive effect on the ECP. Therefore, ECP is improved by the improvement on ENP. Figure 3 the conceptual framework is proposed.

## CONCLUSION

The aim of this study is to provide a comprehensive conceptual understanding of GSCM and GSC practices in terms of NRBV. In this study, the GSCM has been explored on a more in-depth and theoretical level by integrating the NRBV theory and addressing the performance measure of the firm. This study provides managerial insights and useful references for managers to embark on GSC practices implementation and the influence on the environmental and economic performance.

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